

PLANT BIOLOGY

Description

Website: <http://agronomy.unl.edu/plant-biology> (<http://agronomy.unl.edu/plant-biology/>)

The plant biology degree program provides flexible entry for undergraduate students that have an interest in the plant sciences. Once enrolled in the program, students will take a core of classes that will allow them to continue in the plant biology degree program or allow them to easily transfer to other Life Sciences programs. Students will have the opportunity to interact and gain research experience with the faculty of the Center for Plant Science Innovation as well as the above departments and schools for advising, internships, and research opportunities.

Studying plant biology will allow students to explore their knowledge of plants at the following levels:

1. Molecular. (Biotechnology Option)
2. Cellular and organismal. (biological, biochemical/chemical sciences)
3. Whole plant/applied physiological. (horticulture and agronomy courses)
4. Ecological. (Ecology and Management Option)

Students may select a bachelor of science track through the College of Agricultural Sciences and Natural Resources. Every student must complete a set of core courses that provide breadth in basic sciences. Introduction to plant biology should be taken during the first semester in the program. Students also must complete an emphasis to provide depth in one of the following options: Biotechnology or Ecology and Management.

The plant biology program includes a career experience/internship course (PLAS 295/RNGE 295/SOIL 295; BIOS 395; PLAS 395T; NRES 497) which provides the opportunity to gain work experience in an off-campus setting related to a student's academic and career objectives.

A research project initiated by the beginning of the junior year is required. The presentation of this work will be part of the Plant Biology Portfolio and Assessment course.

Students interested in plant biology through the College of Agricultural Sciences and Natural Resources are advised to make an initial appointment with Program Director David Holding (dholding2@unl.edu) and/or academic advisors, Christian Elowsky (celowsky@unl.edu) or Cheryl Dunn (cdunn3@unl.edu).

College Requirements

College Admission

Requirements for admission into the College of Agricultural Sciences and Natural Resources (CASNR) are consistent with general University admission requirements (one unit equals one high school year): 4 units of English, 4 units of mathematics, 3 units of natural sciences, 3 units of social sciences, and 2 units of world language. Students must also meet performance requirements: a 3.0 cumulative high school grade point average OR an ACT composite of 20 or higher, writing portion not required OR a score of 1040 or higher on the SAT Critical Reading and Math sections OR rank in the top one-half of graduating class; transfer

students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance.

Admission Deficiencies/Removal of Deficiencies

Students who are admitted to CASNR with core course deficiencies must remove these deficiencies within the first 30 credit hours at the University of Nebraska–Lincoln, or within the first calendar year at Nebraska, whichever takes longer. College-level coursework taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by the completion of specified courses in the University or by correspondence.

The Office of Admissions, Alexander Building (south entrance), City Campus, provides information to new students on how deficiencies can be removed.

College Degree Requirements

Curriculum Requirements

The curriculum requirements of the College consist of three areas: ACE (Achievement-Centered Education), College of Agricultural Sciences and Natural Resources Core, and Degree Program requirements and electives. All three areas of the College Curriculum Requirements are incorporated within the description of the Major/Degree Program sections of the catalog. The individual major/degree program listings of classes ensure that a student will meet the minimum curriculum requirements of the College.

World Languages/Language Requirement

Two units of a world language are required. This requirement is usually met with two years of high school language.

Experiential Learning

All undergraduates in the College of Agricultural Sciences and Natural Resources must take an Experiential Learning (EL) designated course. This may include 0-credit courses designed to document co-curricular activities recognized as Experiential Learning.

Minimum Hours Required for Graduation

The College grants the bachelors degree in programs associated with agricultural sciences, natural resources, and related programs. Students working toward a degree must earn at least 120 semester hours of credit. A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

Grade Rules

Removal of C-, D, and F Grades

Only the most recent letter grade received in a given course will be used in computing a student's cumulative grade point average if the student has completed the course more than once and previously received a grade or grades below C in that course.

The previous grade (or grades) will not be used in the computation of the cumulative grade point average, but it will remain a part of the academic record and will appear on any transcript.

A student can remove from their cumulative average a course grade of C-, D+, D, D-, or F if the student repeats the same course at the University of Nebraska and receives a grade other than P (pass), I (incomplete), N

(no pass), W (withdrew), or NR (no report). If a course is no longer being offered, it is not eligible for the revised grade point average computation process.

For complete procedures and regulations, see the Office of the University Registrar website at <http://www.unl.edu/regrec/course-repeats> (<http://www.unl.edu/regrec/course-repeats/>).

Pass/No Pass

Students in CASNR may take any course offered on a Pass/No Pass basis within the 24-hour limitation established by the Faculty Senate. However, a department may specify that the Pass/No Pass status of its courses be limited to non-majors or may choose to offer some courses for letter grades only.

GPA Requirements

A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

Transfer Credit Rules

To be considered for admission a transfer student, Nebraska resident or nonresident, must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who have completed less than 12 credit hours of college study must submit either ACT or SAT scores.

Ordinarily, credits earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject any of them. Sixty (60) is the maximum number of hours the University will accept on transfer from a two-year college. Ninety (90) is the maximum number of hours the University will accept from a four-year college. Transfer credit in the degree program must be approved by the degree program advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major. At least 9 hours in the major field, including the capstone course, must be completed at the University of Nebraska–Lincoln regardless of the number of hours transferred.

The College will accept no more than 10 semester hours of C-, D+, D, and D- grades from other schools. The C-, D+, D, and D- grades can only be applied to free electives. This policy does not apply to the transfer of grades from UNO or UNK to the University of Nebraska–Lincoln.

Joint Academic Transfer Programs

The College of Agricultural Sciences and Natural Resources has agreements with many institutions to support joint academic programs. The transfer programs include dual degree programs and cooperative degree programs. Dual degree programs offer students the opportunity to receive a degree from a participating institution and also to complete the requirements for a bachelor of science degree in CASNR. Cooperative programs result in a single degree from either the University of Nebraska–Lincoln or the cooperating institution.

Dual Degree Programs

A to B Programs

The A to B Program, a joint academic program offered by the CASNR and participating community colleges, allows students to complete the first two years of a degree program at the participating community college

and continue their education and study in a degree program leading toward a bachelor of science degree.

The A to B Program provides a basic knowledge plus specialized coursework. Students transfer into CASNR with junior standing.

Depending on the community college, students enrolled in the A to B Program may complete the requirements for an associate of science at the community college, transfer to the University of Nebraska–Lincoln, and work toward a bachelor of science degree.

Participating community colleges include:

- Central Community College
- Metropolitan Community College
- Mid-Plains Community College
- Nebraska College of Technical Agriculture
- Nebraska Indian Community College
- Northeast Community College
- Southeast Community College
- Western Nebraska Community College

3+2 Programs

Two specialized degree programs in **animal science** and **veterinary science** are offered jointly with an accredited college or school of veterinary medicine. These two programs permit CASNR animal science or veterinary science students to receive a bachelor of science degree from the University of Nebraska–Lincoln with a degree in animal science or veterinary science after successfully completing two years of the professional curriculum in veterinary medicine at an accredited veterinary school. Students who successfully complete the 3+2 Program, must provide transcripts and complete the Application for Degree form via MyRED. Students without MyRED access may apply for graduation in person at Husker Hub in the Canfield Administration Building, or by mail. Students should discuss these degree programs with their academic advisor.

Cooperative Degree Programs

Academic credit from the University and a cooperating institution are applied towards a four-year degree from either the University of Nebraska–Lincoln (University degree-granting program) or the cooperating institution (non-University degree-granting program). All have approved programs of study.

UNL Degree-Granting Programs

A University of Nebraska–Lincoln degree-granting program is designed to provide students the opportunity to complete a two-year program of study at one of the four-year institutions listed below, transfer to CASNR, and complete the requirements for a bachelor of science degree.

Chadron State College. Chadron State College offers a 2+2 program leading to a grassland ecology and management degree program and a transfer program leading to a bachelor of science in agricultural education in the teaching option.

Wayne State College. Wayne State College offers a 3+1 program leading to a bachelor of science in plant biology in the ecology and management option and a 3+1 program leading to a bachelor of science in Applied Science.

University of Nebraska at Kearney. Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

University of Nebraska at Omaha. Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

Non University of Nebraska–Lincoln Degree-Granting Programs

CASNR cooperates with other institutions to provide coursework that is applied towards a degree at the cooperating institution. Pre-professional programs offered by CASNR allow students to complete the first two or three years of a degree program at the University prior to transferring and completing a degree at the cooperating institution.

Chadron State College–Range Science. The 3+1 Program in range science allows Chadron State College students to pursue a range science degree through Chadron State College. Students complete three years of coursework at Chadron State College and one year of specialized range science coursework (32 credit hours) at CASNR.

Residency

Students must complete at least 30 of the total hours for their degree using University of Nebraska–Lincoln credits. At least 18 of the 30 credit hours must be in courses offered through CASNR¹ (>299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another Nebraska college and excluding independent study regardless of the number of hours transferred. Credit earned during education abroad may be used toward the residency requirement if students register through the University of Nebraska–Lincoln and participate in prior-approved education abroad programs. The University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residence.

¹ Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBIO, ENVR, SCIL, EAEP, ENSC) and CASNR crosslisted courses taught by non-CASNR faculty.

Online and Distance Education

There are many opportunities to earn college credit online through the University of Nebraska–Lincoln. Some of these credits may be applicable not only as elective credits but also toward the fulfillment of the College's education requirements. Credits earned online may count toward residency. However, certain offerings may not be counted toward scholarship requirements or academic recognition criteria.

For further information, contact:

Office of Online and Distance Education
University of Nebraska–Lincoln
305 Brace Labs
Lincoln, NE 68588-0109
402-472-4681
<http://online.unl.edu/>

Independent Study Rules

Students wishing to take part in independent studies must obtain permission; complete and sign a contract form; and furnish copies of the contract to the instructor, advisor, departmental office, and the Dean's Office. The contract should be completed before registration. Forms are available in 103 Agricultural Hall or online at the CASNR website.

Independent study projects include research, literature review or extension of coursework under the supervision and evaluation of a departmental faculty member.

Students may only count 12 hours of independent study toward their degrees and no more than 6 hours can be counted during their last 36 hours earned, excluding senior thesis, internships, and courses taught under an independent study number.

Other College Degree Requirements

Capstone Course Requirement

A capstone course is required for each CASNR degree program. A capstone course is defined as a course in which students are required to integrate diverse bodies of knowledge to solve a problem or formulate a policy of societal importance.

ACE Requirements

All students must fulfill the Achievement Centered Education (ACE) requirements. Information about the ACE program may be viewed at ace.unl.edu (<https://ace.unl.edu/>).

The minimum requirements of CASNR reflect the common core of courses that apply to students pursuing degrees in the college. Students should work with an advisor to satisfy ACE outcomes 1, 2, 3, 4, 6, and 10 with the college requirements.

Catalog Rule

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to the University of Nebraska–Lincoln or when they were first admitted to a Joint Academic Transfer Program. Students transferring from a community college, but without admission to a Joint Academic Transfer Program, may be eligible to fulfill the requirements as stated in the catalog for an academic year in which they were enrolled at the community college prior to attending the University of Nebraska–Lincoln. This decision should be made in consultation with academic advisors, provided the student a) was enrolled in a community college during the catalog year they are utilizing, b) maintained continuous enrollment at the previous institution for 1 academic year or more, and c) continued enrollment at the University of Nebraska–Lincoln within 1 calendar year from their last term at the previous institution. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at the University of Nebraska–Lincoln in the College of Agricultural Sciences and Natural Resources. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Learning Outcomes

Graduates of plant biology will be able to:

1. Be confident in explaining how various plants grow and reproduce and predict how they will respond to their growing environment.
2. Plan and conduct experiments that are designed to test hypotheses and then communicate their discoveries in formats designed for other scientists or for the public.
3. Use the principles of ecology to analyze and interpret the interactions of the plant, animal, environmental, and economic aspects of grassland ecosystems. (Ecology and Management Option)

- Identify management strategies for grasslands that ensure sustained productivity and resilience. (Ecology and Management Option)
- Envision and design genetic and production improvements in plants to better meet the needs of people or changes in plant production environments. (Biotechnology Option)
- Be competitive applicants for graduate programs worldwide in plant biology.

Major Requirements

The core requirements and one of the options must be completed.

Core Requirements

College Integrative Course (ACE 8)

SCIL 101	Science and Decision-Making for a Complex World	3
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Career Experience and Experiential Learning

Select one of the following: 1

PLAS 295 / Internship
RNGE 295 /
SOIL 295

GRAS 398R Research Experiences in Grasslands

Credit Hours Subtotal: 4

Mathematical and Statistics (ACE 3)

STAT 218	Introduction to Statistics	3
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Select one of the following: 3-5

MATH 103 College Algebra and Trigonometry
MATH 106 Calculus I

Credit Hours Subtotal: 6-8

ACE 1, 2, 5, 6, 7, 9

Written Communication (ACE 1)

Select one of the following: 3

ENGL 150 Writing and Inquiry
ENGL 151 Writing for Change
ENGL 254 Writing and Communities

JGEN 120

JGEN 200

JGEN 300

Oral Communication (ACE 2)

Select one of the following: 3

ALEC 102 Interpersonal Skills for Leadership
COMM 101 Communication in the 21st Century
COMM 209 Public Speaking

COMM 210 Communicating in Small Groups

COMM 215 Visual Communication

COMM 283 Interpersonal Communication

COMM 286 Business and Professional Communication

JGEN 300

MRKT 257 Sales Communication

NRES 260 Introduction to Conservation Photography

TMFD 121 Visual Communication with Animation

Economics (ACE 6)

Select one of the following: 3

AECN 141 Introduction to the Economics of Agriculture

ECON 200 Economic Essentials and Issues

ECON 211 Principles of Macroeconomics

ECON 212 Principles of Microeconomics

Credit Hours Subtotal: 9

ACE Requirement

Select one course each from ACE outcomes 5, 7, and 9 9

Credit Hours Subtotal: 9

Natural Sciences

Chemistry (ACE 4)

CHEM 109A General Chemistry I 4
& CHEM 109L and General Chemistry I Laboratory (ACE 4)

CHEM 110A General Chemistry II 4
& CHEM 110L and General Chemistry II Laboratory

PLAS 153 / Soil Resources 4
SOIL 153

Select one of the following: 4-5

PHYS 141 Physics for Life Sciences I

PHYS 151 Elements of Physics

Select from the following: 4-8

Organic and Biochemistry

Select one sequence from the following: 8-11

Sequence 1

CHEM 251 Organic Chemistry I
& CHEM 253 and Organic Chemistry I Laboratory

OR

CHEM 261 Mechanistic Organic Chemistry I
& CHEM 263 and Mechanistic Organic Chemistry I Laboratory

AND

BIOC 401 Elements of Biochemistry
& 401L and Laboratory for Elements of Biochemistry

Sequence 2

CHEM 251 Organic Chemistry I
& CHEM 253 and Organic Chemistry I Laboratory
& CHEM 252 and Organic Chemistry II

OR

CHEM 261 Mechanistic Organic Chemistry I
& CHEM 263 and Mechanistic Organic Chemistry I Laboratory
& CHEM 262 and Mechanistic Organic Chemistry II

AND

BIOC 431 Biochemistry I: Structure and Metabolism

Biological Sciences 4

LIFE 120 Fundamentals of Biology I 4
& 120L and Fundamentals of Biology I laboratory (ACE 4)

LIFE 121 Fundamentals of Biology II 4
& 121L and Fundamentals of Biology II Laboratory 1

PLAS 278 Botany 4

PLAS 215 Genetics 4
or BIOS 201 General Genetics

NRES 220 & NRES 222 or BIOS 207	Principles of Ecology and Ecology Laboratory ² Ecology and Evolution	4
PLAS 325	Introductory Plant Physiology	4
Credit Hours Subtotal:		56-64
Total Credit Hours		84-94

¹ Minimum C grade required.

² Ecology option students must take BIOS 207

Ecology and Management Option

Required Courses

PLAS 444 / GRAS 444 / NRES 444 / RNGE 444	Ecosystem Monitoring and Assessment	3
PLAS 442 / GRAS 442 / NRES 442 / RNGE 442	Wildland Plants	3
Credit Hours Subtotal:		6

Earth Sciences

Select one of the following:		3
SOIL 101	Soil and Society	
NRES 208	Climate Literacy in Natural Resources	
NRES 218	Introduction to Geospatial Technologies	
NRES 281 / GEOG 281	Introduction to Water Science	

GIS, Remote Sensing and Environmental Systems

Select one of the following:		3-4
NRES 408 / GEOG 408 / METR 408 / PLAS 408	Microclimate: The Biological Environment	
NRES 415	GIS for Agriculture and Natural Resources	
NRES 418	Introduction to Remote Sensing	
NRES 420 / GEOG 419 / PLAS 419	Applications of Remote Sensing in Agriculture and Natural Resources	
Credit Hours Subtotal:		6-7

Biology

Plant-Animal-Organismal Interactions

Select one of the following:		3-4
BIOS 368	Plants in Human Medicine: Biological, Social, and Ethical Dimensions	
NRES 255 / PLAS 255 / SOIL 255	Soil Health and Environment	
PLAS 460 / BIOS 460 / NRES 460 / SOIL 460	Soil Microbial Ecology	
ENTO 115 / BIOS 115 & ENTO 116 / BIOS 116	Insect Biology and Insect Identification	

ENTO 406 / BIOS 406	Insect Ecology	
Credit Hours Subtotal:		3-4

Ecology and Management

Select two of the following:		7-8
NRES 211	Introduction to Conservation Biology	
BIOS 416	Biodiversity Conservation	
PLAS 340 / GRAS 340 / RNGE 340	Range Management and Improvement	
PLAS 426	Invasive Plants	
PLAS 440 / GRAS 440 / NRES 440 / RNGE 440	Great Plains Ecosystem	
NRES 424	Forest Ecology	
PLAS 204	Resource-Efficient Crop Management	
NRES 310	Introduction to Forest Management	
NRES 245 / PLAS 245	Introduction to Grassland Ecology and Management	
PLAS 435	Agroecology	
NRES 438	Grassland Conservation: Planning and Management	

Credit Hours Subtotal:		7-8
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ACE 10 Course (Capstone)

choose one of the following:		3
BIOS 454 / NRES 454	Ecological Interactions	
PLAS 403	Scientific Writing and Communication	

Credit Hours Subtotal:		3
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Electives

Select 12-18 credits		12-18
Credit Hours Subtotal:		12-18

Total Credit Hours		37-46
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Agricultural Biosciences Option

Required Courses

PLAS 135	Experiments in Plant Science	1
BIOS 312	Microbiology	3
or PLAS 460 / BIOS 460 / NRES 460 / SOIL 460		
BIOS 478 / PLAS 478	Plant Anatomy	4
PLAS 410	Plant Molecular Biology	3
<i>Bioinformatics</i>		
Select one of the following:		3-4
BIOC 442 / STAT 442	Computational Biology	
BIOS 477	Bioinformatics and Molecular Evolution	
BIOS 337	Applications of Bioinformatics	
BIOS 427	Practical Bioinformatics Laboratory	
BIOS 426	Systems Biology	

PLAS 420	Bioinformatics Applications in Agriculture	
<i>ACE 10 Course (Capstone)</i>		
Select one of the following:		3
BIOS 421 / MBIO 421	Microbial Diversity	
BIOS 420 / MBIO 420	Molecular Genetics	
PLAS 403	Scientific Writing and Communication	
<i>Option Electives</i>		17
<i>Genetics and Breeding</i>		
Select 6 credits from the the following:		6
BIOS 337	Applications of Bioinformatics	
BIOS 426	Systems Biology	
BIOS 427	Practical Bioinformatics Laboratory	
BIOS 418	Advanced Genetics	
BIOS 420 / MBIO 420	Molecular Genetics	
BIOS 429	Phylogenetic Biology	
BIOS 477	Bioinformatics and Molecular Evolution	
PLAS 409A	Case studies in plant breeding: Breeding for Disease Resistance	
PLAS 409B	Case Studies in plant breeding: Transgenic strategies for disease resistance	
PLAS 415	Applied Plant Breeding and Genetics	
PLAS 420	Bioinformatics Applications in Agriculture	
PLAS 462	Cannabis Growth, Production and Breeding Basics	
PLAS 411	Crop Genetic Engineering	
PLAS 412	Crop and Weed Genetics	
STAT 442 / BIOC 442	Computational Biology	
<i>Applied Biosciences</i>		
Select 6 credits from the the following:		6
BIOS 368	Plants in Human Medicine: Biological, Social, and Ethical Dimensions	
BIOC 434 / BIOS 434 / CHEM 434 / PLAS 434	Plant Biochemistry	
BIOS 202	Genetics, Molecular and Cellular Biology Laboratory	
BIOS 421 / MBIO 421	Microbial Diversity	
ENTO 115 & ENTO 116	Insect Biology and Insect Identification	
ENTO 409	Insect Control by Host-Plant Resistance	
FDST 205	Food Composition and Analysis	
FDST 415	Food Mycology	
FDST 455	Microbiology of Fermented Foods	
NRES 406 / PLAS 406	Plant Ecophysiology: Theory and Practice	
PLAS 307	Hydroponics for Growing Populations	
PLAS 131	Plant Science	
PLAS 221	Plant Propagation	

PLAS 227	Introductory Turfgrass Management	
PLPT 270 / NRES 270 / PLAS 270	Biological Invaders	
PLAS 306	Greenhouse Practices and Management	
PLAS 426 / NRES 426	Invasive Plants	
PLAS 430	Introduction to Plant Diagnostics	
PLAS 435 / NRES 435	Agroecology	
PLAS 460 / BIOS 460 / NRES 460 / SOIL 460	Soil Microbial Ecology	
PLPT 210	Plant Pathogens and Disease	
PLPT 400 & 400L	Plant Pathology In Depth and Intermediate Plant Pathology Lab	
Credit Hours Subtotal:		46-47
Electives		
Select 8-13 credits		8-13
Credit Hours Subtotal:		8-13
Total Credit Hours		54-60

Plant Protection Option**Required Courses**

PLPT 210	Plant Pathogens and Disease	2
PLAS 135	Experiments in Plant Science	1
ENTO 115 / BIOS 115	Insect Biology	3
ENTO 116 / BIOS 116	Insect Identification	1
BIOS 478 / PLAS 478	Plant Anatomy	4
Select 3-4 hours from the following:		3-4
PLPT 400 & 400L	Plant Pathology In Depth and Intermediate Plant Pathology Lab	
ENTO 403	Management of Horticultural Crop Insects	
ENTO 406 / BIOS 406	Insect Ecology	
ENTO 409	Insect Control by Host-Plant Resistance	
ENTO 412	Entomology and Pest Management	

Bioinformatics

Select one of the following:		3-4
STAT 442 / BIOC 442	Computational Biology	
BIOS 477	Bioinformatics and Molecular Evolution	
BIOS 337	Applications of Bioinformatics	
BIOS 427	Practical Bioinformatics Laboratory	
BIOS 426	Systems Biology	
PLAS 420	Bioinformatics Applications in Agriculture	
<i>ACE 10 Course (Capstone)</i>		
Select one of the following:		3
BIOS 421 / MBIO 421	Microbial Diversity	

BIOS 420 / MBIO 420	Molecular Genetics	
PLAS 403	Scientific Writing and Communication	
PLAS 405	Crop Management Strategies	
PLPT 418	Microbial Genetics & Genomics	
Credit Hours Subtotal:		20-22

Option Electives

Biological Sciences

Select 3 credits from the following: 3

BIOS 202	Genetics, Molecular and Cellular Biology Laboratory	
BIOS 418	Advanced Genetics	
BIOS 420 / MBIO 420	Molecular Genetics	
PLPT 418	Microbial Genetics & Genomics	
BIOS 429	Phylogenetic Biology	
BIOS 454 / NRES 454	Ecological Interactions	
BIOS 477	Bioinformatics and Molecular Evolution	
NRES 406 / PLAS 406	Plant Ecophysiology: Theory and Practice	
PLAS 131	Plant Science	
PLAS 132	Agronomic Plant Science Laboratory	
	or PLAS 135 Experiments in Plant Science	
PLAS 221	Plant Propagation	
PLPT 270 / NRES 270 / PLAS 270	Biological Invaders	
NRES 408 / METR 408 / PLAS 408	Microclimate: The Biological Environment	
PLAS 411	Crop Genetic Engineering	
PLAS 412	Crop and Weed Genetics	
BIOC 434 / CHEM 434 / PLAS 434	Plant Biochemistry	
PLAS 460 / BIOS 460 / NRES 460 / SOIL 460	Soil Microbial Ecology	
BIOS 421	Microbial Diversity	

Plant Protection

Select 9 credits from the following: 9

AGST 316	Technologies and Techniques in Digital Agriculture	
BIOS 444 / GEOL 444	Earth and Environmental Microbiology	
BIOS 454 / NRES 454	Ecological Interactions	
ENTO 401	Insect Physiology	
ENTO 403	Management of Horticultural Crop Insects	
ENTO 406 / BIOS 406	Insect Ecology	
ENTO 409	Insect Control by Host-Plant Resistance	
ENTO 412	Entomology and Pest Management	

NRES 415	GIS for Agriculture and Natural Resources	
NRES 418	Introduction to Remote Sensing	
NRES 420 / GEOG 419 / PLAS 419	Applications of Remote Sensing in Agriculture and Natural Resources	
PLAS 405	Crop Management Strategies	
PLAS 410	Plant Molecular Biology	
PLAS 426 / NRES 426	Invasive Plants	
PLAS 430	Introduction to Plant Diagnostics	
PLAS 431	Site-specific Crop Management	
PLAS 435 / NRES 435	Agroecology	
PLAS 460	Soil Microbial Ecology	
PLPT 414 / PLAS 414	Turfgrass Disease Management	
PLPT 415	Corn Diseases	
PLPT 418 / MBIO 418	Microbial Genetics & Genomics	

Credit Hours Subtotal: 12

Electives

Select 4-10 credits 4-10

Credit Hours Subtotal: 4-10

Total Credit Hours 36-44

Additional Major Requirements

Grade Rules

C- and D Grades

A grade of C or better is required in all courses (except free electives) in the major or minor.

Pass/No Pass

Students in plant biology may not take any of the core or option courses required for the degree Pass/No Pass except for the Exploring Plant Biology and Career Experience courses.

Program Assessment. To gauge the effectiveness of this program, students will be required to start and maintain an experiential portfolio throughout their program and complete an assessment survey.

Requirements for Minor Offered by Department

Requirements for the minor include a minimum of 19 hours of coursework with a minimum of 7 hours at the 300 level or above.

Requirements

PLAS 131 & PLAS 132	Plant Science and Agronomic Plant Science Laboratory	4
or PLAS 131 & PLAS 133	Plant Science and Horticultural Plant Science Laboratory	
PLAS 278	Botany	4
PLAS 325	Introductory Plant Physiology	4
Credit Hours Subtotal:		12

Focus

Select one focus from the following: 7-8

Biotechnology Focus

PLAS 215 Genetics
or BIOS 201 General Genetics

Select any 300- or 400-level course from the following:

BIOC 442 /
STAT 442 Computational Biology

BIOS 302 Cell Biology

BIOS 312 Microbiology

BIOS 317 The Biology of Plants

BIOS 337 Applications of Bioinformatics

BIOS 368 Plants in Human Medicine: Biological,
Social, and Ethical Dimensions

BIOS 418 Advanced Genetics

BIOS 420 /
MBIO 420 Molecular Genetics

BIOS 425 Plant Biotechnology

BIOS 427 Practical Bioinformatics Laboratory

BIOS 429 Phylogenetic Biology

BIOS 457 /
GEOL 457 Ecosystem Ecology

BIOS 471 Plant Systematics

BIOS 477 Bioinformatics and Molecular Evolution

BIOS 478 /
PLAS 478 Plant Anatomy

NRES 406 /
PLAS 406 Plant Ecophysiology: Theory and Practice

PLAS 306 Greenhouse Practices and Management

PLAS 355 Perennial, Pot and Bedding Plant
Production Laboratory

PLAS 403 Scientific Writing and Communication

PLAS 405 Crop Management Strategies

PLAS 408 /
GEOG 408 /
METR 408 /
NRES 408 Microclimate: The Biological Environment

PLAS 411 Crop Genetic Engineering

PLAS 412 Crop and Weed Genetics

PLAS 426 /
NRES 426 Invasive Plants

PLAS 434 /
BIOC 434 /
BIOS 434 /
CHEM 434 Plant Biochemistry

PLAS 435 /
NRES 435 Agroecology

PLAS 437 Animal, Food and Industrial Uses of Grain

PLAS 438 Producing Grain for Animal, Food and
Industrial Uses

PLAS 454 /
NRES 454 Specialty Crop Innovations

PLAS 460 /
BIOS 460 /
NRES 460 /
SOIL 460 Soil Microbial Ecology

PLPT 400 Plant Pathology In Depth

Ecology and Management Focus

NRES 220 Principles of Ecology

NRES 222 Ecology Laboratory

Select any 300- or 400-level course from the following:

BIOS 317 The Biology of Plants

BIOS 368 Plants in Human Medicine: Biological,
Social, and Ethical Dimensions

BIOS 454 /
NRES 454 Ecological Interactions

BIOS 457 /
GEOL 457 Ecosystem Ecology

BIOS 475 Avian Biology

BIOS 476 /
NRES 476 Mammalogy

GEOG 418 /
NRES 418 Introduction to Remote Sensing

NRES 310 Introduction to Forest Management

NRES 311 Wildlife Ecology and Management

NRES 348 Wildlife Damage Management

NRES 408 /
GEOG 408 /
METR 408 /
PLAS 408 Microclimate: The Biological Environment

NRES 417 /
PLAS 418 Agroforestry Systems in Sustainable
Agriculture

NRES 424 Forest Ecology

NRES 438 Grassland Conservation: Planning and
Management

NRES 459 /
BIOS 459 Limnology

NRES 468 /
BIOS 458 /
BSEN 458 Wetlands

PLAS 340 /
GRAS 340 /
RNGE 340 Range Management and Improvement

PLAS 403 Scientific Writing and Communication

PLAS 440 /
GRAS 440 /
NRES 440 /
RNGE 440 Great Plains Ecosystem

PLAS 442 /
GRAS 442 /
NRES 442 /
RNGE 442 Wildland Plants

PLAS 444 /
GRAS 444 /
NRES 444 /
RNGE 444 Ecosystem Monitoring and Assessment

PLAS 460 /
BIOS 460 /
NRES 460 /
SOIL 460 Soil Microbial Ecology

Credit Hours Subtotal:

7

Total Credit Hours

19

Grade Rules

C- and D Grades

A grade of C or better is required in all courses in the minor.

PLPT 210 Plant Pathogens and Disease

Prerequisites: PLAS 131, BIOS 101, ENTO 115, or LIFE 120.

Description: Introduction to fungi, bacteria, nematodes and viruses that cause plant diseases. The impact that plant diseases can have on society and the environment. Strategies used in managing plant diseases in agricultural and landscape environments.

Credit Hours: 2

Max credits per semester: 2

Max credits per degree: 2

Grading Option: Graded with Option

PLPT 270 Biological Invaders

Crosslisted with: PLAS 270, NRES 270

Prerequisites: 3 hrs biological sciences.

Description: Impact of exotic species and invasive organisms: agricultural and medical emerging disease; predicting biological invasions; biological control; regulatory, monitoring, and control efforts; ecological impact.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Grading Option: Graded with Option

PLPT 400 Plant Pathology In Depth

Crosslisted with: PLPT 800

Prerequisites: PLPT 400: PLPT 210, BIOS 312 or equivalent. Concurrent registration in PLPT 400L. PLPT 800: coursework in microbiology (or plant pathology) is strongly recommended.

Description: Exploring the biology of plant pathogens, pathogen-host plant interactions, and environmental influences on plant diseases. Examining cultural, chemical, and biological strategies, along with host resistance, for plant disease management. Builds on topics covered in PLPT 210, with additional emphasis on the strategies employed by the four major groups of plant pathogens, plant responses to disease-causing organisms, and approaches to disease management.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Grading Option: Graded with Option

Offered: SPRING

Prerequisite for: PLPT 801, AGRO 801, HORT 801

PLPT 400L Intermediate Plant Pathology Lab

Crosslisted with: PLPT 800L

Prerequisites: Concurrent enrollment in PLPT 400/800

Notes: BIOS 314 recommended. At present, PLPT 400/800 may be taken without PLPT 400L/800L.

Description: Companion lab for PLPT 400/800

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Grading Option: Graded with Option

Offered: SPRING

Course and Laboratory Fee: \$60

PLPT 412 Bacterial Lifestyles

Crosslisted with: PLPT 812

Prerequisites: BIOS 312 or BIOS 201 or PLAS 215

Description: Covers principles of bacteriology focusing on the strategies bacteria use to thrive and survive in many different environments including non-living surfaces, and other living organisms.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Grading Option: Graded

Offered: SPRING

PLPT 414 Turfgrass Disease Management

Crosslisted with: AGRO 814, HORT 814, PLPT 814, PLAS 414, TLMT 814

Prerequisites: BIOS/PLPT 369 or one semester of introductory plant pathology.

Description: Pathogens, epidemiology, and control of diseases specific to turfgrass.

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Grading Option: Graded with Option

PLPT 415 Corn Diseases

Crosslisted with: PLPT 815

Prerequisites: PLPT 210 or PLPT 400 or equivalent

Notes: Taught online only. This is an 8-week mini-course.

Description: Introduction to the important diseases affecting corn (maize) in Nebraska and other areas of the United States. Pathogen biology, favorable conditions, disease diagnosis based on symptomatology and management strategies are emphasized

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Grading Option: Graded

PLPT 418 Microbial Genetics & Genomics

Crosslisted with: PLPT 818, MBIO 418

Prerequisites: BIOS 201 or PLAS 215.

Notes: BIOS 312 is recommended.

Description: Inheritance, exchange, and regulation of genes in prokaryotic microorganisms: gene structure and function; gene transfer and the elements (plasmids, phages, and transposons) involved; DNA mutations, repair, and genetic analysis; genome sequencing, microbial genome databases, and global gene expression analysis.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Grading Option: Graded

Prerequisite for: PLPT 801, AGRO 801, HORT 801

ACE: ACE 10 Integrated Product

PLPT 475 Biosecurity and Bioterrorism: Science, Security, and Society**Crosslisted with:** PLPT 875**Prerequisites:** PLPT 475 - Junior standing or permission of instructor / PLPT 875 - Graduate Student standing**Description:** A broad, interdisciplinary introduction to biosecurity and bioterrorism as emerging challenges to national and global security. Focus areas include the history of biological threats, emerging technologies, and the networks that detect, diagnose, and defend against them. Topics cover natural resources, plant and animal health, biosafety, bioterrorism, biowarfare, laws and regulations, economic impacts, and countermeasures.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**Offered:** SPRING**Experiential Learning:** Case/Project-Based Learning**PLPT 495 Internship in Plant Pathology****Prerequisites:** Junior standing.**Description:** Experience in a work place setting that is directly related to Plant Pathology.**Credit Hours:** 1-3**Min credits per semester:** 1**Max credits per semester:** 3**Max credits per degree:** 5**Grading Option:** Pass No Pass**PLPT 496 Independent Study****Prerequisites:** Advanced approval of the plan of study and permission.**Description:** Research, literature review, extension of course work, or preparation of teaching materials.**Credit Hours:** 1-5**Min credits per semester:** 1**Max credits per semester:** 5**Max credits per degree:** 5**Grading Option:** Graded with Option**PLPT 498 Independent Research****Prerequisites:** Permission.**Description:** Independent research in areas of plant pathology.**Credit Hours:** 1-3**Min credits per semester:** 1**Max credits per semester:** 3**Max credits per degree:** 6**Grading Option:** Graded with Option**PLPT 499H Honors Thesis****Prerequisites:** Admission to the University Honors Program and permission**Notes:** AGRI 299H recommended**Description:** Conduct a scholarly research project and write a University Honors Program or undergraduate thesis.**Credit Hours:** 3-6**Min credits per semester:** 3**Max credits per semester:** 6**Max credits per degree:** 6**Grading Option:** Graded

Career Information

The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.

Transferable Skills

- Communicate results of scientific experiments to scientific and non-scientific audiences
- Apply mathematical and scientific skills to solve real-world problems
- Make predictions using mathematical, statistical, and scientific modeling methods
- Define problems and identify causes
- Understand and use proper laboratory and technical skills and instruments
- Collaborate with a team to develop solutions
- Confidently navigate complex, ambiguous projects and environments
- Design and implement research experiments
- Document and replicate processes and procedures

Jobs of Recent Graduates

- North American Trait Integration Breeder, Monsanto - Chesterfield, MO
- Plant Protection Technician, USDA - Lincoln, NE
- Data Analyst, Zoex Corporation - Houston, TX
- Associate Sales Manager, Theisen Seed LLC - Atkinson, NE
- Distance Education Instructor, University of Nebraska-Lincoln - Lincoln, NE
- Site Manager, Sustainable Agriculture Education - Berkeley, CA
- Groundskeeper, Burr Oak Lodge - Eagle, NE
- Graduate Research Assistant, University of Nebraska-Lincoln - Lincoln, NE

Internships

- Intern, DuPont Pioneer - Johnston, IA
- Research Assistant, Plant Pathology, University of Nebraska-Lincoln - Lincoln, NE
- Cover Crop Research Intern, University of Nebraska-Lincoln - Lincoln, NE
- Research Intern, Nebraska Forest Service - Lincoln NE
- Intern, Grassland Ecology - Wood River, NE
- Pioneer Sales Associate Intern, Theisen Seed LLC - Atkinson, NE
- Crop Production Intern, University of Nebraska-Lincoln - Lincoln, NE
- Research Intern, Molecular Plant Physiology, University of Nebraska-Lincoln - Lincoln, NE

Graduate & Professional Schools

- Ph.D., Genetics, Iowa State University - Ames, IA
- Ph.D., Evolutionary Ecology, Colorado State University - Fort Collins, CO
- Ph.D., Plant Breeding and Genetics, Purdue University - Lafayette, IN
- Ph.D., Entomology, University of Arkansas - Fayetteville, AR
- Ph.D., Agronomy and Horticulture, University of Nebraska-Lincoln - Lincoln, NE
- Master's in Agronomy, University of Nebraska-Lincoln - Lincoln, NE
- Master's in Plant Breeding and Genetics, University of Nebraska-Lincoln - Lincoln, NE
- Master's in Biological Sciences, University of Nebraska-Lincoln - Lincoln, NE
- Master's in Entomology and Plant Pathology, Colorado State University - Fort Collins, CO



- Master's in Horticulture, University of Nebraska-Lincoln - Lincoln, NE
- Ph.D., Horticulture, University of Nebraska Lincoln - Lincoln, NE